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Case Report

Pregnancy with chemotherapy induced cardiomyopathy (EF 30%): a tertiary care success story

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ABSTRACT

Chemotherapy-induced cardiomyopathy in pregnancy represents a rare but high-risk clinical scenario, particularly when left ventricular ejection fraction falls below 30%. Limited literature exists on the peripartum management of such cases. A 23-year-old primigravida with a history of osteogenic sarcoma treated with chemotherapy presented at 36 weeks of gestation with chemotherapy-induced dilated cardiomyopathy and ejection fraction of 30%. The patient was hemodynamically stable on admission with vital signs of heart rate 100 bpm and blood pressure 120/80 mm Hg. Echocardiography revealed global left ventricular hypokinesia, trivial mitral regurgitation and dilated left atrium. Obstetric ultrasound showed normal foetal growth with normal doppler studies. A multidisciplinary approach was implemented involving obstetrics, cardiology, anaesthesiology and neonatology teams. Elective lower segment caesarean section was performed under combined spinal-epidural anaesthesia using 0.2% lignocaine with fentanyl. Comprehensive perioperative monitoring included central venous access, ICU preparedness, and availability of inotropic support. The procedure resulted in successful delivery of a healthy female neonate with estimated blood loss of 700 ml. The patient remained hemodynamically stable throughout the perioperative period and was discharged on postoperative day 8 without complications. This case demonstrates that pregnancy complicated by severe chemotherapy-induced cardiomyopathy can be successfully managed through coordinated multidisciplinary care, appropriate timing of delivery and regional anaesthesia techniques in a tertiary care setting. The favourable outcome achieved despite the patient's critically low ejection fraction emphasizes the importance of specialized cardio-obstetric expertise and comprehensive peripartum planning.

Keywords: Cardiomyopathy, Pregnancy complications, Cesarean section, Anaesthesia, Spinal anaesthesia, Epidural, Antineoplastic agents, Drug therapy, Peripartum period, Multidisciplinary care, High-risk pregnancy

INTRODUCTION

Cardiac disease complicates 1-4% of pregnancies and represents a leading contributor to maternal morbidity and mortality worldwide.[1] The physiological changes of pregnancy, including increased cardiac output, blood volume expansion and altered hemodynamic, pose significant challenges for women with pre-existing cardiac dysfunction.[2] While rheumatic heart disease remains the most common cardiac condition complicating pregnancy in developing countries, the spectrum of cardiac disease in pregnancy has evolved significantly with improved cancer survivorship rates. Chemotherapy-induced cardiomyopathy (CIMP) represents one of the most serious long-term sequelae of cancer treatment, affecting up to 5% of cancer survivors.[4] The cardiotoxic effects of chemotherapeutic agents, particularly anthracyclines such as doxorubicin, can manifest as both acute and chronic cardiac dysfunction. With the remarkable improvement in childhood cancer survival rates over the past two decades, an increasing number of young female cancer survivors are reaching their reproductive years and seeking to conceive.[5]

The incidence of pregnancy-associated cardiac events in female cancer survivors is reported to be significantly higher compared to the general population, with a relative risk of 4.18 for cardiac morbidity during pregnancy.[6]

Dilated cardiomyopathy (DCM) is characterized by global systolic dysfunction and ventricular dilatation, which in the context of pregnancy endangers both maternal cardiac function and foetal well-being.[7] According to the European society of cardiology (ESC) guidelines, patients with a Left ventricular ejection fraction (LVEF) less than 30% are classified as high-risk, with significantly increased rates of cardiac failure, arrhythmias, and maternal mortality during pregnancy.[8,9] When the LVEF falls below 35%, there is a heightened risk of cardiac decompensation, making pregnancy a formidable challenge requiring meticulous multidisciplinary planning.[10]

The management of pregnant women with chemotherapy-induced cardiomyopathy presents unique clinical challenges. Previous studies have demonstrated that women with a history of CTRCD compared to those without had a 47.4-fold higher odds of experiencing pregnancy-related LV dysfunction or HF.[11] The absolute risk of pregnancy-induced heart failure in female cancer survivors is generally low; however, in those who received anthracycline chemotherapy or chest radiation, the risk is substantially higher than in healthy populations.[12] Sliwa et al reported particularly high mortality rates in peripartum cardiomyopathy patients with LVEF less than 30%, emphasizing the critical importance of early risk assessment and delivery in tertiary care centers.[13]

The anaesthetic management of these high-risk pregnancies requires careful consideration of multiple factors. Regional anaesthesia techniques, particularly combined spinal-epidural anaesthesia, have been advocated for cardiac patients to minimize sympathetic stimulation and maintain hemodynamic stability.[14,15] Ouzounian et al demonstrated that regional techniques in cardiac patients help minimize the cardiovascular stress associated with general anaesthesia while providing excellent surgical conditions.[16] The choice of anaesthesia must be individualized based on the patient's cardiac reserve, urgency of delivery and coagulation status.

Regarding timing of delivery, current evidence supports elective delivery at 36-37 weeks of gestation to optimize foetal maturity while reducing maternal cardiac stress. Silversides et al recommended this timing based on the balance between foetal lung maturity and the increasing hemodynamic burden of advancing pregnancy.[17] The mode of delivery should be determined by obstetric indications and maternal cardiac status, with caesarean section often preferred for women with severely compromised cardiac function to avoid the hemodynamic fluctuations associated with labor.[18] The importance of multidisciplinary care cannot be overstated in managing these complex cases. The ESC Guidelines emphasize collaborative management involving cardiologists, obstetricians, anaesthesiologists, and neonatologists as essential for improving maternal and foetal outcomes.[19] This approach ensures comprehensive peripartum monitoring, appropriate timing of interventions, and immediate availability of advanced cardiac support if required.

Despite advances in understanding and management, pregnancy in women with chemotherapy-induced cardiomyopathy remains a high-risk scenario with limited evidence-based guidelines. Most recommendations are derived from case reports, small case series and expert consensus due to the rarity of this condition. The successful management of such cases requires not only clinical expertise but also careful preoperative planning, vigilant intraoperative monitoring, and intensive postoperative care in specialized cardiac centres.

This case report presents the successful peripartum management of a primigravida with chemotherapy-induced dilated cardiomyopathy and an ejection fraction of 30%, highlighting the practical approach to managing similar high-risk cardiac pregnancies in tertiary care settings. The case demonstrates the effectiveness of multidisciplinary coordination, appropriate timing of delivery and the use of regional anaesthesia in ensuring favourable maternal and neonatal outcomes.

CASE REPORT

A 23-year-old primigravida presented at 36 weeks of gestation to DY Patil Hospital, Navi Mumbai for antenatal care registration. The patient had a significant past medical history of osteogenic sarcoma of the left humerus, which was diagnosed and treated with chemotherapy and surgical excision several years prior to her pregnancy. Two years following her cancer treatment, she developed chemotherapy-induced dilated cardiomyopathy and was maintained on cardiac medications including digoxin and metoprolol.

Upon admission, the patient was hemodynamically stable with vital signs showing a heart rate of 100 beats per minute and blood pressure of 120/80 mm Hg. Clinical examination revealed no signs of decompensated heart failure at the time of presentation. Despite her stable clinical condition, her cardiac function remained significantly compromised from the previous chemotherapy exposure.

Echocardiographic assessment revealed severe left ventricular systolic dysfunction with a LVEF of 30%. The echocardiogram demonstrated global left ventricular hypokinesia, trivial mitral regurgitation, pulmonary artery systolic pressure of 20 mm Hg and a dilated left atrium measuring 36 mm. These findings were consistent with established chemotherapy-induced dilated cardiomyopathy. Electrocardiographic evaluation showed sinus rhythm with slight left axis deviation, low QRS

voltage complexes and clockwise rotation pattern. These ECG changes were consistent with her underlying cardiomyopathy and provided additional evidence of the cardiac structural abnormalities.

Obstetric ultrasound examination demonstrated normal foetal growth parameters appropriate for gestational age. Doppler studies of the umbilical and middle cerebral arteries were within normal limits, indicating adequate fetoplacental circulation despite the maternal cardiac condition. The foetal assessment provided reassurance regarding foetal well-being prior to delivery planning.

Given the patient's high cardiac risk status with an ejection fraction of 30%, a multidisciplinary approach was implemented involving obstetrics, cardiology, anaesthesiology and neonatology teams. The case was classified as high-risk according to European society of cardiology guidelines, as patients with LVEF less than 35% have significantly increased risk of cardiac failure, arrhythmias and maternal mortality during pregnancy.

After careful consideration of maternal cardiac status and foetal maturity, the decision was made to proceed with elective lower segment caesarean section under combined spinal-epidural anaesthesia. This approach was chosen to minimize the hemodynamic stress associated with labour while providing optimal surgical conditions and avoiding the cardiovascular depression associated with general anaesthesia.

Extensive perioperative precautions were implemented to ensure maternal safety. Central venous access was established for accurate hemodynamic monitoring and fluid management. The intensive care unit was prepared for immediate postoperative monitoring, with inotropic support and blood products readily available. The anaesthesia team prepared for combined spinal-epidural technique to provide stable hemodynamic conditions throughout the procedure.

The elective caesarean section was successfully performed, resulting in the delivery of a healthy female neonate. The estimated blood loss during the procedure was approximately 700 ml, which was well within acceptable limits for this high-risk patient. The surgical procedure was completed without intraoperative complications and maternal hemodynamic stability was maintained throughout the operation.

Following delivery, the patient was transferred to the intensive care unit for continuous monitoring. Postoperative management included careful fluid balance with diuretics, continuation of cardiac medications and hemodynamic monitoring. The patient remained stable throughout her postoperative course without evidence of cardiac decompensation or other complications. The patient's recovery proceeded smoothly with no signs of heart failure exacerbation or other cardiac complications. She was monitored closely for eight days post-operatively, during which time she remained hemodynamically stable. Both mother and baby had favourable outcomes, with the patient being discharged on postoperative day 8 in stable condition with appropriate follow-up arrangements.

This case represents a successful management approach for one of the most challenging scenarios in maternal medicine pregnancy complicated by severe chemotherapy-induced cardiomyopathy. The patient's LVEF of 30% placed her in a high-risk category with significant potential for maternal morbidity and mortality. The successful outcome was achieved through meticulous multidisciplinary planning, appropriate timing of delivery, careful anaesthetic management and intensive perioperative monitoring in a tertiary care setting equipped to handle such complex cases.

DISCUSSION

The case demonstrates the importance of specialized cardio-obstetric care for cancer survivors who develop cardiac complications and subsequently become pregnant. It highlights the feasibility of achieving favourable maternal and neonatal outcomes even in patients with severely compromised cardiac function when managed by an experienced team with appropriate resources and planning.

This case highlights the successful peripartum management of a young primigravida with severe chemotherapy-induced dilated cardiomyopathy (EF 30%), echoing both established principles and recent advances cardio-obstetric care.[20-23] Current evidence underscores that women with history of anthracycline or chest radiation therapy are at particularly elevated risk for pregnancy-related left ventricular dysfunction and heart failure; the absolute risk during pregnancy remains low, but is dramatically amplified in those with known cardiomyopathy prior to conception.[11,21,22]

A pivotal shift in contemporary management comes from the 2023 and 2025 ESC guidelines, which advocate for individualized, multidisciplinary approaches and the central role of advanced cardio-obstetric teams.[20-23] The ESC now recommends risk stratification using the updated mWHO 2.0 classification, highlighting EF <30% as mWHO class IV (extremely high risk), but explicitly emphasizing shared decision-making, empowering patient autonomy and nuanced risk–benefit discussion.[20-23] In this context, pregnancy is not an absolute contraindication even in those with severely reduced ejection fraction, as outcomes may be favourable with stringent monitoring and resource-intensive multidisciplinary care a point very recently reinforced in case series and cohort reviews (2024-2025).[21,22]

Recent literature and guideline-driven practice increasingly prioritize a tailored delivery and anaesthesia plan. While earlier consensus favoured elective caesarean

in all severe cardiac patients, the latest ESC guidance (2025) recommends mode of delivery should be determined by obstetric and cardiac indications, with vaginal delivery preferred unless instability or obstetric need for caesarean arises.[20-23] In those with advanced heart failure or as in the present case, a planned caesarean under regional anaesthesia is considered prudent, particularly when performed by an experienced anaesthesiology team using combined spinal-epidural techniques to optimize hemodynamic control.[14,21,23,24]

Advanced cardiac monitoring including availability of biomarkers (e.g., NT-proBNP) and when feasible, serial LV strain imaging has been advocated in new reports to enable anticipatory management of decompensation during pregnancy and the puerperium.[21,22] Modification of guideline-directed medical therapy (GDMT) is of utmost importance: recent reviews continue to support beta-blockers (preferably metoprolol/bisoprolol), diuretics and cautious use of digoxin as the main safe options, while ACE inhibitors and ARBs are to be strictly avoided throughout gestation.[21-23]

Recent international case series (2023-2025) describe successful maternal and foetal outcomes amongst patients with significant chemotherapy-induced LV dysfunction, paralleling this case in demonstrating the transformative value of institutional protocols, anticipatory planning and seamless team communication.[21-23] However, these experiences also caution that success should not diminish the acknowledgement of high risk such outcomes are generally restricted to well-resourced tertiary centres and most guidelines continue to advise preconception counselling highlighting the substantial maternal, foetal and neonatal risks.[20-23]

In summary, this case is well aligned with the most recent ESC and published practice: pregnancy in those with severe, chemotherapy-induced cardiomyopathy (EF ~30%) remains an exceptionally high-risk scenario but may be accomplished safely with:

Multidisciplinary cardio-obstetric care involving cardiology, maternal-foetal medicine, anaesthesiology and neonatology is essential for optimal outcomes. Advanced preoperative preparation with ICU backup and vigilant postoperative monitoring further improves maternal and foetal safety. Individualized delivery planning, tailored to the evolving maternal and foetal condition, is also crucial. Where hemodynamic status permits, the use of regional anaesthesia is preferred to enhance stability and reduce risks. Additionally, heart failure therapy should be carefully adjusted to balance maternal benefits with foetal safety.[20-24]

The success in this case reinforces the message of the latest international heart societies: with modern, team-based, evidence-guided care, even the highest-risk cardio-oncology pregnancies can, in selected circumstances, result in favourable outcomes but these should be considered momentous exceptions, not new general standards.[20-23]

CONCLUSION

This case demonstrates that pregnancy complicated by severe chemotherapy-induced cardiomyopathy with an ejection fraction of 30% can be successfully managed through meticulous multidisciplinary planning, appropriate timing of elective delivery and careful anaesthetic management using combined spinal-epidural technique. The successful outcome achieved in this high-risk patient underscores the importance of tertiary care facilities with expertise in cardio-obstetric management, early risk stratification and coordinated care involving obstetrics, cardiology, anaesthesiology and neonatology teams. While pregnancy is generally discouraged in patients with ejection fraction below 30%, this case illustrates that with comprehensive care and intensive monitoring, favourable maternal and neonatal outcomes are achievable even in patients at the critical threshold of cardiac dysfunction.

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